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Metropolitan Life Insurance Co.

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GREATER GAINS AMONG YOUNG MEN IN TUBERCULOSIS DECLINE

In the May number of the STATISTICAL BULLETIN we spoke of the sharply declining deathrate from tuberculosis and called attention to the promising outlook for new and sharp drops in the mortality in the near future. As we then noted, both the white and colored races have shared in the improvement. We may now add that the rate is also declining for each of the sexes and for every age group.

Nevertheless, during the very period when the death toll of tuberculosis has been dropping there has been an important change in the relationship between the two sexes, in the white race, between the ages of 20 and 25 years. Prior to 1915 tuberculosis took a lighter toll of life among the females of this group than among the males. In 1911, for example, the deathrate among white females insured in the Industrial Department of the Metropolitan Life Insurance Company, in this age range, was 263.3 per 100,000, as compared with 288.6 among white males; that is, the mortality among the former was only 91.2 per cent. of that among the latter. In 1913, it was 90.9 per cent. and in 1914, 95.1 per cent. With 1915, however, there began a reversal of the sex incidence of tuberculosis, and this has become more and more marked as time has gone on. In 1915, the mortality among the young white women of this age group was 2.6 per cent. *in excess of* that for males. In two recent years the mortality among young females has actually exceeded that among males by more than 50 per cent.

This reversal of the sex incidence has taken place during a period when the deathrate has declined 65.2 per cent. among white males at these ages and 46.6 per cent. among white females. That is, the deathrate has declined much faster among the males than the females. It is difficult to assign a reason for this; but one possible reason may be suggested. During this period of years, and especially

during the war years, there has been increasing industrialization of young women. It is entirely possible that as more young women have been exposed to the stresses of regular employment, outside of the home, the likelihood of the sex to contract tubercular infection has not declined to the same extent as has obtained for young men. Thus, despite all the favorable factors that have operated to bring about a declining deathrate from tuberculous disease, among all races, in each sex, and in each age group, young white women have not shared the benefits to the extent that has obtained for young men.

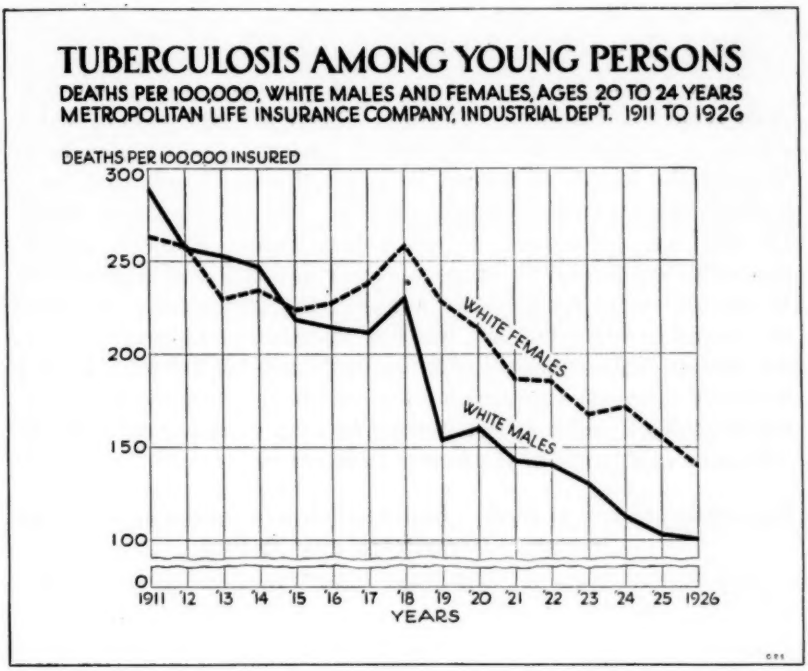
We cannot emphasize too strongly the point that this changed sex incidence in the mortality from tuberculosis should not make us less optimistic as to the future of the campaign against this disease. We simply call attention here to the fact that, *contemporaneous with a declining deathrate*, something has occurred within the past fifteen years to cause the mortality among the young white women to be higher than that of young white men—instead of lower, as was the case a little more than a decade ago.

The accompanying table and the graph on page 3 show the course of the deathrate among white Industrial policyholders in the age period, 20 to 24 years, for the period 1911 to 1926.

Deathrates from Tuberculosis (All Forms) White Males and Females Ages 20 to 24 Years, 1911 to 1926.

Metropolitan Life Insurance Company, Industrial Department Premium Paying Business

YEAR	DEATHRATES PER 100,000		
	WHITE MALES	WHITE FEMALES	PER CENT. FEMALE OF MALE (Male = 100)
1926	100.4	140.5	139.9
1925	103.0	155.4	150.9
1924	112.8	171.6	152.1
1923	130.3	167.4	128.5
1922	140.6	185.6	132.0
1921	142.8	186.9	130.9
1920	160.1	213.8	133.5
1919	153.9	228.4	148.4
1918	230.5	258.5	112.1
1917	211.5	238.0	112.5
1916	214.3	227.6	106.2
1915	218.8	224.5	102.6
1914	246.8	234.7	95.1
1913	252.9	230.0	90.9
1912	257.0	257.9	100.4
1911	288.6	263.3	91.2


TUBERCULOSIS AMONG YOUNG PERSONS
DEATHS PER 100,000, WHITE MALES AND FEMALES, AGES 20 TO 24 YEARS
METROPOLITAN LIFE INSURANCE COMPANY, INDUSTRIAL DEP'T. 1911 TO 1926
DEATHS PER 100,000 INSURED
300
250
200
150
100
0
WHITE FEMALES
WHITE MALES
1911 '12 '13 '14 '15 '16 '17 '18 '19 '20 '21 '22 '23 '24 '25 1926
YEARS

EXPECTATION OF LIFE IN 1926 SOMEWHAT LOWER THAN IN 1925

We are now able to add another year to our retrospective survey of the expectation of life at birth. In the year 1926, as shown in the table on page 4, this figure was 55.02 years, at birth, for our total Industrial policyholders. A glance at the table shows that this makes the year 1926 practically identical, as regards expectation of life, with the year 1922, and not quite as good as the intervening years. The setback is, however, very slight: about half a year. We may view this slight retrogression with the more complacency, as the current year, for which the final figures will, of course, not be available for some months to come, has been an exceptionally good health year which will result in a longer expectation of life, provided the remaining quarter measures up to the standards so far set. Besides, it is a matter of common experience that in every endeavor the last few notches toward the top are the hardest to gain. The economist is familiar with this principle, which he calls the law of diminishing returns. The same holds true of every field of human

effort. A point is reached where conditions become essentially stabilized and every gain is bought at a higher cost.

There is much in the future trend of the expectation of life that must remain a matter of conjecture. There are two ways in which advances in medical knowledge and in sanitary practice operate to increase the length of human life. On the one hand, there is a general improvement affecting more or less all causes of death, through the betterment of living conditions. National health, generally, was bound to improve as our national wealth increased. Better and more food; better housing; the demolishing of slums; the spread of education, and hence of more rational living; in brief, our modern higher standard of living, could not fail to have a general beneficial effect on man's chances of surviving. For there are few causes of death which do not respond to the preventive and curative influences arising out of the factors enumerated.

Expectation of Life at Birth. Metropolitan Life Insurance Company Industrial Department, 1911 to 1926

Year	Expectation in Years
1926	55.02
1925	55.51
1924	55.62
1923	54.55
1922	55.04
1921	55.08
1919-1920	51.14
1911-1912	46.63
Gain, 1926 since 1911-1912	8.39

On the other hand, medical science has from time to time come forward with a specific cure or preventive measure for a particular disease or class of diseases. Instances of this will readily occur to the reader, such as vaccination for smallpox, toxin-antitoxin immunization against diphtheria, aseptic surgery, insulin for diabetes, etc. Gains from such sources are by no means exhausted.

There remain with us, nevertheless, several diseases and conditions in the face of which medical science of today is relatively unsuccessful. Many forms of cancer fall into this class, as do, to a lesser extent, such diseases as chronic nephritis and certain forms of heart disease. The recent trend of the mortality from these conditions is far from encouraging. It is a question whether these points of resistance will counterbalance the gains from the influences

to which we have referred, namely, the general improvement in living conditions and increased medical skill. In view of this situation, we must reckon with the possibility that the expectation of life, for some years to come, may perhaps show no very marked further improvement. There is always a possibility, and we shall certainly continue to entertain the hope, that some day remedies, or effective preventive measures, may be found for some of the outstanding scourges that remain unsolved at the present time.

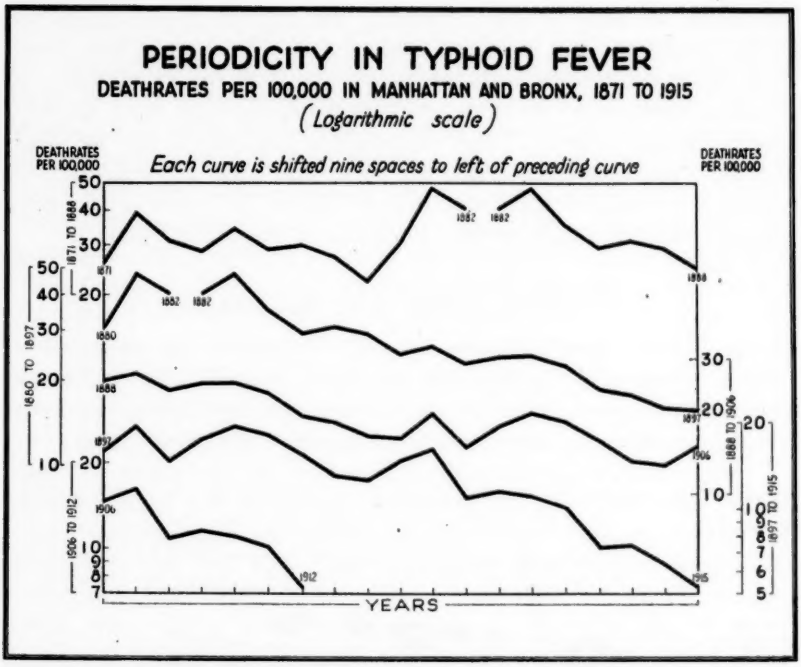
TYPHOID FEVER AND RAINFALL

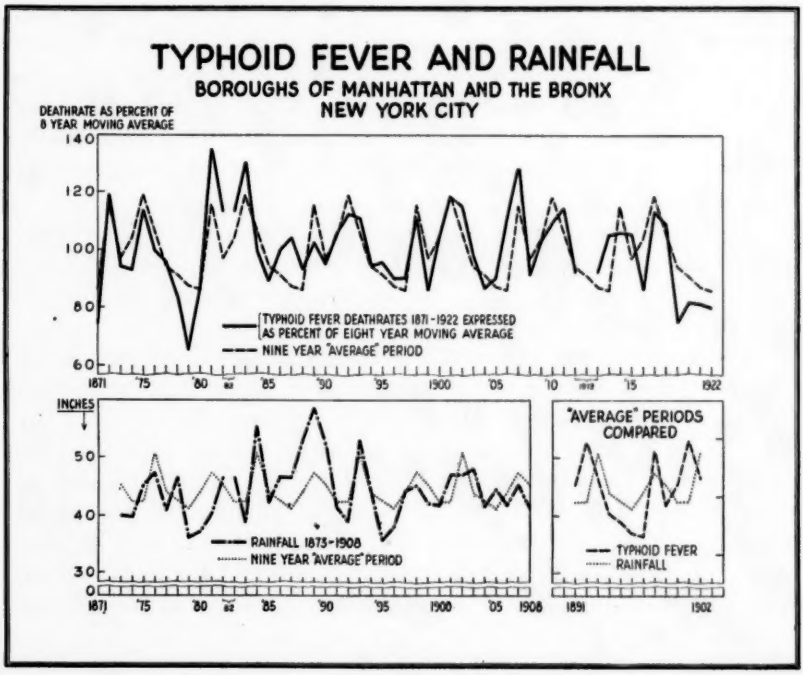
In the October, 1925, issue of this BULLETIN we presented a number of graphs of the deathrate from typhoid fever in certain cities of the Union. These graphs brought out very clearly a periodic alternation of crests and troughs spaced about eight years apart.

Since then the corresponding figures for the Boroughs of Manhattan and the Bronx in New York City have been analyzed with interesting results. We find here a clear picture of a nine-year wave, rising to a crest in 1872, 1881, 1889, 1898, and 1907 and dipping to the trough of the wave in the years 1879, 1888, 1897 and 1905. There is also a clearly marked secondary crest at the years 1875, 1883, 1892, 1901 and 1909, and a secondary trough at the years 1874, 1882, 1890, 1899 and 1908. It will be seen that the intervals between corresponding crests are 9, 8, 9, 9 years for the primary crest; 8, 9, 9, 8 for the secondary crest; 9, 9, 8 for the primary trough, and 8, 8, 9, 9 for the secondary trough. Thus, in all its parts the wave preserves its typical periodic eight or nine year undulation. This situation is brought out rather strikingly in the accompanying diagrams.

The uppermost curve in the first diagram is a (logarithmic) plot of the series of deathrates 1871-1888. At the year 1882 the curve has been broken and a gap of one year inserted, for reasons that will presently become apparent.

The second curve is a continuation of the first, but so plotted that the year 1880 falls under the year 1871 of the first curve, that is to say, there is here a nine-year shift between the curves. The third curve is again the continuation of the second, with the year 1888 brought beneath the year 1880 of the second curve, a shift of eight years. The fourth curve is a continuation of the third, similarly shifted, with the year 1897 beneath 1888, a shift of nine years. Lastly, the fifth curve is a continuation of the fourth, again with a shift of nine years. A remarkable similarity in the contour


PERIODICITY IN TYPHOID FEVER
DEATHRATES PER 100,000 IN MANHATTAN AND BRONX, 1871 TO 1915
(Logarithmic scale)
Each curve is shifted nine spaces to left of preceding curve
DEATHRATES PER 100,000
DEATHRATES PER 100,000
1871 TO 1888
1880 TO 1897
1888 TO 1906
1897 TO 1915
1906 TO 1912
YEARS


TYPHOID FEVER AND RAINFALL
BOROUGHS OF MANHATTAN AND THE BRONX
NEW YORK CITY
DEATHRATE AS PERCENT OF 8 YEAR MOVING AVERAGE
TYPHOID FEVER DEATHRATES 1871-1922 EXPRESSED AS PERCENT OF EIGHT YEAR MOVING AVERAGE
NINE YEAR "AVERAGE" PERIOD
INCHES
RAINFALL 1873-1908
NINE YEAR "AVERAGE" PERIOD
"AVERAGE" PERIODS COMPARED
TYPHOID FEVER
RAINFALL

of the successive curves is immediately apparent to the eye. Five peaks occur vertically underneath one another at 1872, 1881, 1889, 1898 and 1907. A second set falls at 1875, 1883, 1892, 1901 and 1909. Not only this, but there is a great similarity in the general outline of the curves, which nest into one another in striking manner. Perhaps it should be pointed out that the right hand portion of the diagram is essentially a repetition of the left hand portion, so that the coincidence of the crests and troughs in this right hand half do not represent additional evidence. The curves have been drawn in this manner with two periods at a stretch to bring out more perfectly the general character of the waves.

It will be seen that the deathrates have undulated in periods of essentially nine years, though the second period, 1880-1888, is one year short. This is the reason for putting a one-year gap at the year 1882. The parallelism becomes much more clearly evident by the insertion of this gap.

The second diagram brings out essentially the same facts in another way, and at the same time exhibits certain other features of interest. Here deathrates are plotted not directly, but expressed as percentage of an eight-year moving average. This series is shown in a solid line. The line of dashes is the plot of an "average" period repeated over and over. This average period was computed as shown in the appended table by writing the deathrates of the years 1871 to 1879 as successive items in a first line, then in a second line, item for item, under these figures, the deathrates from 1880 to 1887, repeating the figure for the year 1882 to fill in the gap in this "short" period; under these figures were placed those for 1888 to 1896 and under these again the figures for 1897 to 1905. The nine columns of four figures each were then added, and the sum divided by four, as shown below. This gave a set of nine "average" deathrates corresponding to the nine successive years of a typical period. The years 1906-1925 were omitted in this computation, as the deathrates here became small and the periodicity was not quite so regularly apparent. In the upper fully drawn curve a gap of two years has also been inserted at the year 1912; but this part of the curve was not used in computing the average period.

It was thought that there might be a connection between the periodic fluctuations in the deathrate from typhoid fever and any possible periodic fluctuations in weather conditions. The series of figures for the rainfall in New York in the years 1873-1908 were, therefore, treated in practically the same way as the figures for the

deathrate from typhoid fever, except that in this case there was no need to go through the step of expressing the data in terms of a moving average, as there is practically no secular trend in rainfall. The figure for the year 1882 was here also written twice over, as in the case of the deathrates, so as to make the correspondence between the two series of figures complete. The actual rainfall figures are plotted in dots and dashes on the lower left in the second drawing, together with the "average" period shown in dots and repeated four times. The diagram on the lower right is a comparison of the run of an average period of typhoid fever deathrates, against the corresponding average period of rainfall. It will be seen that the two

Deaths from Typhoid Fever, Expressed as Per Cent. of Eight-Year Moving Average; Arranged in Four Nine-Year Periods

Boroughs of Manhattan and Bronx, New York City, 1871-1905

Period	Years in Period	1st Year	2d Year	3d Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year
First	1871-1879	74.3	114.0	94.2	93.0	113.8	99.7	95.9	83.9	65.3
Second	1880-1887*	87.0	135.2	113.4	113.4	130.7	99.4	89.2	100.0	104.6
Third	1888-1896	93.3	103.0	95.1	106.0	112.7	111.1	94.6	95.8	90.0
Fourth	1897-1905	90.3	111.0	86.0	104.7	119.0	115.2	98.2	86.8	90.0
Sum of four Periods		344.9	463.2	388.7	417.1	476.2	425.4	377.9	366.5	349.9
Average of four Periods		86.2	115.8	97.2	104.3	119.1	106.4	94.5	91.6	87.5

*The year 1882 is repeated (third and fourth years in period 1880 to 1887).

W-shaped curves show a rather close resemblance, crest falling essentially upon crest, and trough upon trough. There is nowhere more than one year's discrepancy in the position of corresponding crests and troughs. In judging the two discrepancies of one year that do occur in the crests, it must be borne in mind that *absolute* coincidence can hardly be expected. There will necessarily be chance variations in the exact position of the several crests and troughs; and if there should be only as much as a just over three months' chance deviation in one direction in a rainfall peak, with a three months' chance deviation in the opposite direction in the typhoid fever peak, the combined relative deviation of just over six

months would, in the graph, appear as one year, since fractions of a year are not shown. There is, accordingly, some uncertainty as to the precise significance of the findings expressed by this graph. We present the facts and figures here for the study and consideration of our readers, without bias. Parallelism such as this must be viewed with some caution, but it certainly seems very suggestive.

That there should be a relation between rainfall and the death-rate from typhoid fever is in itself plausible, though the precise nature of the relation may be somewhat complicated. For, on the one hand, in an exceptionally wet year the rising level of the ground water is liable to sweep contaminating matter into sources of drinking water that in ordinary times are relatively pure. On the other hand, in very dry weather, consumers may be induced by shortage at their customary sources to draw upon other sources which they would ordinarily avoid. So two conflicting influences may be at work, and it is difficult to say *a priori* just what their resultant effect would be.

HEALTH RECORD FOR AUGUST, 1927

The August deathrate of the American and Canadian industrial populations, which may be reliably gauged by that of the more than eighteen million policyholders of the Metropolitan Life Insurance Company, was 8.1 per 1,000 as compared with 8.0 for August of last year This was the first month of 1927 in which the death-rate exceeded that for the corresponding month of 1926. No special significance attaches to this fact, however, as both rates are very low, and the unfavorable margin is so small that the whole picture is one of an extremely satisfactory health condition both now and a year ago. The mortality in August also exceeded slightly that for July, 1927.

Diphtheria is the only one of the four principal epidemic diseases of childhood to record an increase as compared with last year. As noted in the July BULLETIN, this same situation has obtained in every month of the current year; but the 1927 year-to-date deathrate for diphtheria is, nevertheless, very low as compared with every preceding year save 1926.

The typhoid fever figure, in August, also exceeded that in 1926, as has happened for every month of this year except January. This has been due, almost entirely, to the outbreak in Montreal and environs. The typhoid situation in the States shows improvement over last year and all other years. Up to the week ending September 17th the deathrate was only 2.8 per 100,000 among

Metropolitan Industrial policyholders, as a whole, as compared with 3.5 for the same period of 1926. Nineteen twenty-seven thus bids fair to record a new minimum mortality for typhoid fever in the United States.

There were no notable changes as compared with August, 1926, for any of the diseases of major numerical importance with the single exception of heart disease, the rate for which increased to 114.6 per 100,000 from 101.1 last year. The year-to-date rate for cardiac disease is, nevertheless, running well below that for 1926.

A very gratifying item is the extremely low figure for diarrheal complaints (35.9 per 100,000). This is the lowest August deathrate for these conditions since the Company has insured young infants in its Industrial Department.

The report with respect to violent deaths compares quite unfavorably with that for the corresponding month of last year. Suicides, homicides, accidents and automobile fatalities all recorded increases. Suicides have shown higher rates than in 1926 in seven of the eight elapsed months of this year, and automobile fatalities in six.

The general deathrate for the large cities of the United States in August was 10.2 per thousand population, which is slightly lower than for August, 1926 (10.5). As compared with August of last year there were more case reports of diphtheria, poliomyelitis and scarlet fever, with less prevalence of influenza, measles, smallpox and typhoid. Comparison with July of this year shows increased prevalence of poliomyelitis and typhoid fever, with fewer cases of diphtheria, influenza, measles, scarlet fever and smallpox.

Poliomyelitis, in August, was over twice as prevalent as in July. In forty-two states, 587 cases were reported during the first three weeks of August as compared with 230 for the corresponding weeks of July. Particularly notable increases were recorded in California where case reports rose from 89 in July to 163 in August; Connecticut from 3 to 36; Massachusetts from 10 to 76; and Texas from 7 to 44. According to press statements, Ohio reported 150 cases between August 1st and 25th, with fifteen deaths. In New Jersey there were 70 case reports in the month of August as against five for the corresponding period of last year.

There was a considerable drop in the number of smallpox cases during August as compared with July, with forty states reporting 562 cases during the first three weeks of August as compared with 1,308 during the same weeks of July.

The outstanding item of public health interest was the admission of Louisiana to the Birth Registration Area. This area now includes thirty-nine states comprising 84.4 per cent. of the total population of the country.

The following table shows the mortality among the Industrial policyholders for August, 1927; July, 1927; August, 1926, and the year 1926.

METROPOLITAN LIFE INSURANCE COMPANY

Deathrates* per 100,000 for Principal Causes, Premium-paying Business in Industrial Department (Annual Basis)

MONTHS OF AUGUST, 1927; JULY, 1927, AND OF AUGUST, 1926

CAUSES OF DEATH	RATE PER 100,000 LIVES EXPOSED*			
	Aug. 1927	July, 1927	Aug. 1926	Year 1926
TOTAL—ALL CAUSES	806.8	780.0	797.7	945.6
Typhoid fever	5.6	5.1	4.9	4.2
Measles	1.7	2.7	3.2	10.2
Scarlet fever	1.8	2.1	2.0	3.4
Whooping cough	7.0	6.1	8.0	9.6
Diphtheria	7.5	7.8	5.8	9.7
Influenza	4.5	6.2	5.0	31.1
Tuberculosis (All forms)	90.6	90.5	90.3	99.0
Tuberculosis of resp'y system	79.3	78.8	76.5	86.7
Cancer	74.3	65.6	73.4	73.7
Diabetes mellitus	15.4	13.7	13.2	16.7
Cerebral hemorrhage	44.6	46.8	45.9	55.6
Organic diseases of heart	114.6	111.5	101.1	134.3
Pneumonia (All forms)	38.2	43.4	36.5	98.2
Other respiratory diseases	11.2	12.1	10.4	13.0
Diarrhea and enteritis	35.9	24.5	50.4	29.8
Bright's disease (Chronic nephritis)	61.0	60.3	59.2	73.5
Puerperal state	14.6	13.4	13.4	15.3
Suicides	8.7	7.9	6.8	7.7
Homicides	6.9	6.7	6.3	7.0
Other external causes (excluding suicides and homicides)	73.1	76.8	71.6	62.3
Traumatism by automobiles	19.7	19.7	15.9	16.8
All other causes	189.6	177.0	190.1	191.0

*All figures include infants insured under one year of age.

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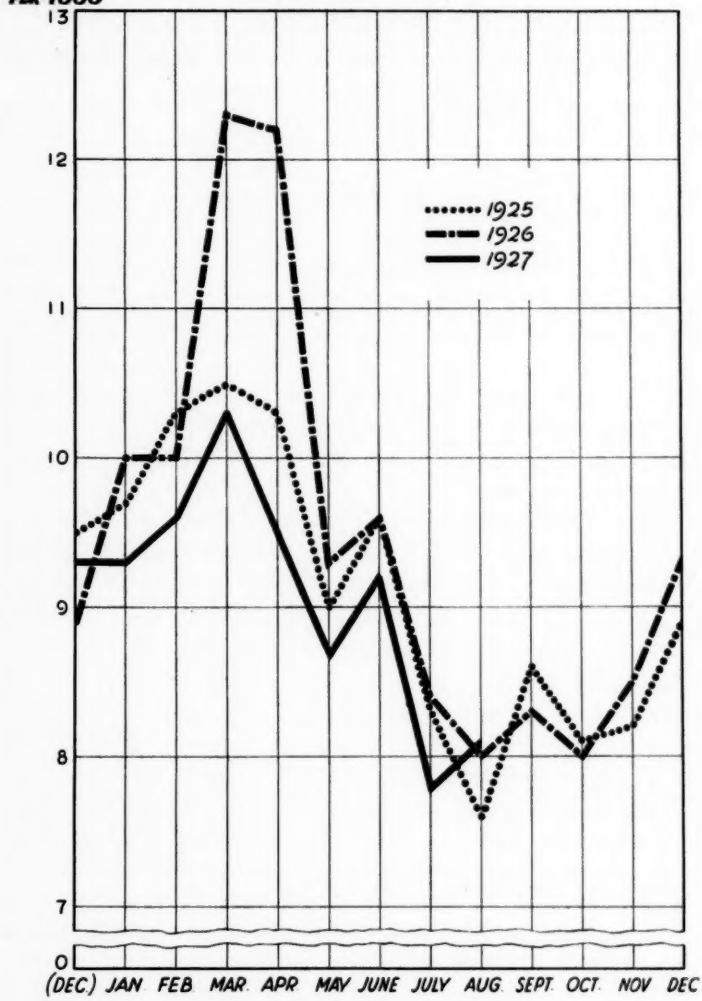
Deathrates from All Causes

METROPOLITAN LIFE INSURANCE CO.
INDUSTRIAL DEPARTMENT
(ANNUAL BASIS)



	(DEC)	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1925		9.7	10.3	10.5	10.3	9.0	9.6	8.3	7.6	8.6	8.1	8.2	8.9
1926		10.0	10.0	12.3	12.2	9.3	9.6	8.4	8.0	8.3	8.0	8.5	9.3
1927		9.3	9.6	10.3	9.5	8.7	9.2	7.8	8.1				

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